changes may be made to those embodiments without departing from the spirit and scope of the invention in its broader aspects.

CLAIMS

What we claim is:

1. An ultra-high resolution radar with flat (or conformal) transmit/receive AESA or AESAs steering beam or beams non-dispersively, comprising:

waveform signal generators which generate a train of designated forms of voltage pulse signals with a designated repetition times, said voltage pulse signal duration is at least longer than the required duration of the AESA transmitting or receiving pulse signals;

a means for creating a plurality of RF FM modulated pulse signals of identical shape and duration but different consecutive magnitude comprising a resistive multiport voltage dividers electrically connected to said waveform generators, said resistive multiport voltage dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage dividers, a plurality of mixers electrically connected to VCOs, STALO, and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and transmitting pulse signals to illuminate radar targets;

a means for generating said transmitting pulse signals which phase and power spectrum depends on azimuth and elevation angles comprising resistive multiport voltage dividers electrically connected to said waveform generators, said resistive multiport voltage dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage dividers, a plurality of mixers electrically connected to VCOs, STALO, and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and transmitting pulse signals to illuminate radar targets;

a transmit/receive flat (or conformal) AESA comprising plurality of said radiating elements uniform or nonuniform spaced, said radiating elements uniform or nonuniform excited to transmit and collect propagating electromagnetic energy which are excited or collect energy in such a way that the bottom left or bottom right radiation element of AESA radiates or receives a nonmodulated carrier signal.

2. An ultra-high resolution radar with transmit/receive AESA or AESAs steering beam or beams non-dispersively, comprising:

waveform signal generators which generates a train of designated forms of voltage pulse signals with designated repetition times, said voltage pulse signal duration is at least longer than the required duration of the AESA receiving pulse signals;

a means for creating a plurality of RF FM modulated pulse signals of identical shape and duration but different consecutive magnitude comprising resistive multiport voltage dividers electrically connected to said waveform generators, said resistive multiport voltage dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage dividers, a plurality of mixers electrically connected to VCOs, STALO, and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and receiving target-echo return pulse signals;

a means for creating and combining the receiving signals which is electrically connected to plurality of LNAs (Low Noise Amplifiers) amplifying said target-echo return signals those are received by a plurality of said radiating elements comprising a plurality of mixers electrically connected to said LNA outputs, said power combiners, and a plurality of said mixers creating said FM signals for transmitting part of said radar;

3. An ultra-high resolution radar with transmit/receive AESA or AESAs steering beam or beams non-dispersively, comprising:

waveform signal generators which generates a train of designated forms of voltage pulse signals with designated repetition times, said voltage pulse signal duration is at least longer than the required duration of the AESA receiving pulse signals;

a means for creating a plurality of RF FM modulated pulse signals of identical shape and duration but different consecutive magnitude comprising resistive multiport voltage dividers electrically connected to said waveform generators, said resistive multiport voltage dividers providing plurality of said voltage pulse signals, a plurality of VCOs electrically connected to said resistive multiport voltage dividers, a plurality of mixers electrically connected to VCOs, STALO, and to a plurality of radiating elements in order to generate signals providing simultaneously the required beam or beams azimuth and elevation steering electronically and receiving target-echo return signals;

a means for producing the receiving signals which is electrically connected to a plurality of LNAs amplifying the signals those are reflected from illuminated targets and received by a plurality of said radiating elements comprising a plurality of mixers electrically connected to said LNA outputs, said power combiners, and a plurality of said mixers creating said FM signals for transmitting part of said radar;

a means for processing target-echo return signals which is electrically connected to said receiving AESA or AESAs, said processing means being electrically connected with narrow band filters in order to enhance signal-to-noise ratio for detecting said target-echo return signals with said phase and power spectrum depending on angular target positions and range of a targets, and in order to get ultra-high angular and range resolution.

References

[1] U.S. Pat. No. 2,426,460, entitled SYSTEM FOR LOCATION A RADIATED-SIGNAL REFLECTOR, filed August 26, 1947, by H. M. Lewis.

[2] D. G. Tucker, V. G. Welsby and R. Kendell, "Electronic Sector Scanning," *J. Brit. IRE,* vol. 18, August 1958.

[3] US Patent 2,852,772, L. G. Gitzendanner, "Receive Scanning System," September 16, 1958.

[4] D. E. N. Davies, "Radar Systems with Electronic Sector Scanning," *J. Brit. IRE,* vol. 18, December 1958.

[5] D. G. Tucker, V. G. Welsby, L. Kay, M. J. Tucker, A. R. Stubbs and J. G. Henderson, "Underwater Echo-Ranging with Electronic Sector Scanning: See Trails on R.R.S. Discovery II," *J. Brit. IRE,* vol. 19, November 1959.

[6] H. E. Shanks, "A New Technique for Electronic Scanning," *IRE Trans. Antennas Propag.,* vol. AP-9, 1961.

[7] H. V. Cottony and A. C. Wilson, "A High-Resolution Rapid-Scan Antenna," *J. Research NBS,* vol. 65D, January-February, 1961.

[8] D. E. N. Davies, "A Fast Electronically Scanned Radar Receiving System," *Br. Inst. Radio Eng. J.,* vol. 21, 1961.

[9] D. F. Langenwalter and K. M. Stevenson, "Receiver Scanning System," *US Patent 2,426,460*, December 5, 1961.

[10] S. P. Applebaum, "Electronic Scanning of Circular Arrays," *US Patent 3,076,193*, January 29, 1963.

[11] P. V. Howells, "MOSAR-Array Multiplex Beamforming Technique," *Symp. Record, 9th Ann. Radar Symp.* (University of Michigan, Ann Arbor), June 1963.

[12] D. E. N. Davies, "The Application of Electronic Sector Scanning techniques to Height-Finding Radar Systems," *IEE Conf. Electron. Res. Dev. Civil Aviation,* October 1963.

[13] W. H. Kummer, A. T. Villeneuve and F. G. Terrio, "Scanning without Phase Shifters," *Electronics,* vol. 36, March 29, 1963.

[14] D. E. N. Davies, "Beam-Positioning Radar Systems Utilizing Continuous Scanning Techniques," *Proc. IEE,* vol. 112, no. 3, 1965

[15] M. A. Johnson, "Phased-Array Beam Steering by Multiplex Sampling," *Proc. of the IEEE,* vol. 56, no11, 1968.

[16] A. K. Edgar and I. L. Jones, "Flood-Lighting with Nyquist Rate Scanning," *AGARD Conf. Proc.*, no. 66, 1970.

[17] M. F. Radford and R. Greenwood, "A Within-Pulse Scanning Height-Finder," *IEE Conf. On Radar and Future,* no. 105, 1973.

[18] D. E. N. Davies, "High Data Rate Radar Incorporating Array Signal Processing and Thinned Arrays," *IEEE Int. Radar Conf.,* 1975.

[19] S. Haykin, "Performance Analysis of a Radar Signal Processing System with Continuous Electronic Array Scanning," 1977, from "Array Processing Applications to Radar," *Banchmark Paper in Electrical Engineering and Computer Science,* vol. 22, 1980.

[21] "Countermeasures. A Technical Evaluation of the Operational Effectiveness of the Planned US National Missile Defense System," April 2000, from Union of Concerned Scientists, MIT Security Studies Program, http://www.ucsusa.org/pablication.cfm?/publicationID=345

[22] U.S. Pat. No. 5,351,053, entitled ULTRA WIDEBAND RADAR SIGNAL PROCESSOR FOR ELECTRONICALLY SCANNED ARRAYS, filed May 27, 1994, by Wicks, et al.